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ABSTRACT

This final report describes activities and accomplishments of the Expressive Arts Project for Young Children with Disabilities, which developed and evaluated a CD-ROM, ArtSpace. The program, developed on a Macintosh platform, allows the child to either view or make art. It offers real time video, music especially produced to accompany images, voice, photographs, graphics, and text, all of which are integrated into the software and are organized around three elements: the "adult gallery," the "children's gallery," and the "studio." A surprising finding during field testing was the increased time and attention demonstrated by children with severe disabilities whose teachers had predicted little or no participation in planned art activities. After the executive summary, individual sections of the report describe the project's objectives and goals, conceptual framework, components, problems and their solutions, impact (including products, recommendations, findings, marketing) and future activities. (DB)

FINAL REPORT

Expressive Arts Project for Young Children with Disabilities

Technology, Educational Media, and Materials
for Individuals with Disabilities with Disabilities Program
U.S. Department of Education
Office of Special Education and Rehabilitative Services
PR #H180D20019
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EXECUTIVE SUMMARY

Expressive Arts Project for Young Children with Disabilities

or

ArtSpace: Interactive CD-ROM Software

A Project of the US. Department of Education's Technology, Educational Media, and Materials for Individuals with Disabilities Program

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Director	Coordinator	Designer and Programmer

Overview. The Expressive Arts Project for Young Children with Disabilities was designed to provide innovative advancements in art activities for young children from 2 through 8 (and older) with moderate to severe disabilities by giving them access to the arts through technology and accompanying curriculum. The project emphasized producing the interactive CD-ROM **ArtSpace** on a Macintosh platform. As the title implies, **ArtSpace** provides a museum space where one can view art or make art. Real time video, music especially produced to accompany images, voice, photographs, graphics, and text are integrated in the software Museum that includes three elements: **The Adult Gallery**, **The Children's Gallery**, and **The Studio**, a simulated drawing environment. A 7 year old child guides users through the software and the museum, providing prompts if that option is selected. **ArtSpace** includes 536 works of art contributed by 11 museums, 26 artists, and 100 children. More than 40 minutes of QuickTime Video and over 90 minutes of sound are included. A wide range of options for differing disabilities and degrees of impairment are included in the software menu. It can be accessed by switch, mouse, keyboard, or TouchWindow. Although **ArtSpace** is intended for young children, its contents are of interest to older children and adults as well since it can be used in so many different ways to meet a variety of objectives for different developmental levels, abilities, and interests.

Some children's art images in the **Children's Gallery** include video so **ArtSpace** users can watch short videos of other children engaged in a variety of art activities and then perhaps experience the activities themselves later, away from the computer. In **The Adult Gallery** selected images are accompanied by videos of artists working in their studios demonstrating processes that include painting, sculpture, ceramics, bronze casting, and printmaking. The emphasis of **ArtSpace** and the accompanying curriculum is on the visual arts, although activities related to music and movement can be integrated into children's experiences by creative adults.

Philosophy. ArtSpace is based on the assumption that art is basic to the human condition, that all children can benefit from art activities, and that art is much more than recreation or therapy. Art is a way of learning, a way of thinking, a way of doing, a way of communicating, and a way to enhance the quality of life for all children. The underlying rationale behind **ArtSpace** is summarized in the narrative of the Final Report.

Purposes. ArtSpace was designed to provide a developmentally appropriate Early Childhood Expressive Arts Technology Curriculum based on interactive, multimedia software residing on a CD-ROM to be used by young children with disabilities, their families, and program team staff. It can be used in art activities that are both experientially based or discipline based, depending on the philosophy of the educational staff using it. **ArtSpace** can be used for many different purposes, depending on children's needs and educational goals, ranging from content regarding various art forms (i.e., drawing, painting, sculpture, pottery), exploring a museum of adult or children's art work, searching for art related to a variety of categories, and participating in simulated drawing activities based on the developmental sequence of images produced by children who are able to make marks with crayons, paint, or markers.

Workscope. The two-year development project began in October of 1992 and continued through December 1994. The project was an ambitious one, with far more personnel energy and time than originally expected spent on designing the software, developing the software elements, interfaces and options, collecting images, voice, music, and video. At the same time, staff spent time testing elements of the software and art activities with children who demonstrated severe physical disabilities.

While we printed beta versions of the CD-ROM as the project progressed, the first 'final' version of **ArtSpace** was pressed at the end of the project, and the documentation was printed. Notes on revisions for the second version are now being maintained.

The accompanying curriculum was developed using activities based on **ArtSpace** content and adaptations from tested curriculum used in The Expressive Arts Project[1], an Early Education Program for Children with Disabilities model demonstration project.

Impact and Findings. In addition to the CD-ROM itself, the impact of **ArtSpace** includes thoughtful recommendations for further multimedia development from three staff members who saw the CD-ROM through to its final production. Recommendations are organized according to staff issues, product development and quality control issues, storage and security issues, and prototype testing issues. These recommendations are intended to serve as a guide to others who decide to follow the multimedia path.

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[1]The Expressive Arts Model Demonstration Project (PR#HO24B20010) is a field tested, effective project funded by the U.S. Department of Education's Early Education Programs for Children with Disabilities, which began in 1992.

Limited findings relate to events occurring during field testing. One surprise during field test activities was the increased time and attention demonstrated by children with severe disabilities, whose teachers had predicted little or no participation in planned art activities. In fact, **ArtSpace** activities were so successful that teachers expressed amazement, as did administrators who came into classrooms to observe. Field testing the art activities in the curriculum resulted in 100% participation by children. Moreover, time on task was increased for many children.

ArtSpace made a positive impact on special educators and others when it was demonstrated. Presentations to special education personnel at national conferences resulted in positive evaluations of the software and curriculum activities and invitations to present at other conferences.

Marketing. Marketing activities conducted by Macomb Projects, focus on a direct mail campaign to a selected mailing list of Macintosh users also interested in early childhood, articles, software review columns, distribution to key early childhood technology professionals and university personnel in 10 states, personal contacts, and national conference presentations. Other dissemination sources are currently being explored, including foundations and museums. Marketing efforts continued after the end of the project and resulted in promising avenues of dissemination.

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The Expressive Arts Project for Young Children with Disabilities
or
ArtSpace: Interactive CD-ROM Software

A Final Report

The Expressive Arts Project for Young Children with Disabilities[1], affectionately known within Macomb Projects as the ArtTech Project, which produced **ArtSpace**, was funded by the U.S. Department of Education's Technology, Educational Media, and Materials for Individuals with Disabilities Program to provide innovative advancements in art activities for young children with moderate to severe disabilities by giving them access to the arts through technology applications. The two-year ArtTech Project began in October of 1992.

Goals and Objectives of the Project

Goals

The Project met its four major goals. The first was to develop, field test, revise and disseminate an effective, replicable Early Childhood Expressive Arts Curriculum and accompanying interactive CD-ROM based on related research findings, current best practices in early childhood and the arts, and technology applications to enhance direct experience in artistic expression for young children from birth to 8 with moderate to severe disabilities. Both the curriculum and **ArtSpace**, the CD-ROM, were completed.

The second was to provide an Implementation and Training Package incorporating guidelines and related materials for using the Expressive Arts products. These are included on the CD-ROM itself and in the curriculum.

The third goal was to provide training to support integration of the Expressive Arts products into artistic activities in schools, homes, agencies, and other community settings. **ArtSpace** training has been incorporated into technology training for early childhood personnel

[1] PR#H180D20019

and families in ACTT[2], the Expressive Arts Project[3], and The Early Childhood Emergent Literacy Technology Project[4].

The fourth was to disseminate the Expressive Arts products and findings actively to schools, families, day care centers, nursery schools, universities, agencies, the private sector, and others across the country so findings can be exchanged and the Expressive Arts Project can be adopted. Currently, dissemination efforts are underway and include elements of carefully targeted direct marketing and other strategies discussed later in this report.

Objectives

Six objectives were designed to meet the Project's goals. These objectives, which were met, included developing a technology curriculum, producing an interactive CD-ROM for children, developing an effective implementation and training package to assist those who implement the curriculum, field testing procedures and materials, disseminating information about the Project, and evaluating the accomplishment of objectives.

Conceptual Framework for the Project

The Expressive Arts Project was based on the assumptions that innovative technology applications provide a way for young children with disabilities to access and participate in the arts and that omitting or down-playing the arts[5] in early intervention programs is a disservice to young children with disabilities and their families. A summary of **ArtSpace** assumptions is contained in Figure 1. Since the arts and the benefits they offer are part of early childhood

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[2]Activating Children Through Technology (PRH024D20044) is an Early Education Program for Children with Disabilities outreach project.

[3]The Expressive Arts Project (PR#H024D20010) is an Early Education Program for Children with Disabilities model demonstration project.

[4]The Early Childhood Emergent Literacy Technology Project (PR#H180G40078) is funded by the Technology, Educational Media, and Materials for Individuals with Disabilities Program.

[5]The term "expressive arts," includes visual arts (two-dimensional forms such as drawing, painting, graphics, and printmaking and three-dimensional forms such as sculpture), music , and drama.

Figure 1. Project Assumptions

Assumptions Related to Children

1. Since the expressive arts are an accepted and integral part of early childhood settings for children **without** disabilities, then it is likely that children **with** disabilities can also stand to benefit through arts activities used in a most inclusive environment.
2. The expressive arts are developmentally appropriate for young children and provide them with a potent means of communication.
3. The visual arts serve as one of the beginning processes in the child's development of symbolic activity. The ability to deal with the abstractions later used in writing and reading has roots in the scribbles, images, and pretend play of the young child.
4. Determining adaptations so that children with moderate to severe disabilities can participate in arts activities is likely to impact early intervention curriculum and benefit children and families.
5. Use of technology carries with it high probabilities that children with moderate to severe disabilities will be able to participate in arts activities in normalized settings since use of use of assistive devices, including computers, provides the child with a means to draw or make music and to access the environment.
6. Far from being only a recreational or leisure activity (although that might very well be enough), the arts provide a vehicle for children to grow in aspects of communication, social abilities, expressive abilities, motor abilities, and the ability to deal effectively with symbols.
7. The expressive arts will provide a vehicle to base intervention activities on children's behaviors rather than specific disability labels, providing services for a heterogeneity of causes and range of performance abilities as suggested by Schutter and Brinker (1992).
8. The behaviors and activities identified in the Expressive Arts curriculum can be used to develop Individual Family Service Plans (IFSPs) and Individual Educational Plans (IEPs).
9. Combining art and music activities, together with experiences from drama, integrate artistic experiences in ways that occur in the "real world."
10. Experiences in the arts can be provided by a range of individuals, including early childhood personnel, family members, artists, and teachers of the arts.

Assumptions Related to Families

1. Family participation in art activities will vary and is expected to be at different levels, depending on the family's wishes.
2. The procedures developed for parent-child interactions in the home relative to the child's art activities will serve as a bridge between home and school, using the child's own products to further involve family in the child's progress. The procedures will be useful to other early intervention programs and families.

Assumptions Related to Current Knowledge and Practice

1. The use of assistive technology in art activities meets the requirements of Part H of IDEA and its amendments which specify use of assistive technology services.
2. Using the developmental standards developed by Kellogg in both the curriculum and CD-ROM will provide a way for youngsters with moderate to severe disabilities to participate in the same kind of developmental image-making process as typical children.
3. The arts integrate a wide variety of early childhood content in an activity-based curriculum including emerging literacy.
4. Since no systematic and comprehensive Expressive Arts curriculum or software related to art appreciation and developmentally appropriate image-making for young children with moderate to severe disabilities is presently available for distribution, the Project will fill a gap for early childhood intervention staff and families.
5. The Project will ultimately provide field-tested cost-effective materials and procedures to replicate the curriculum in other sites so that others have the opportunity to realize the benefits of the arts for young children with disabilities.
6. The Project products emphasize consistent follow-up and staff development and learning opportunities for families by means of new materials and activities which will lead to more effective practices.
7. The curriculum and CD-ROM provide a way for early childhood staff and families to focus on the child's behavior and individual competence rather than a specific disability label.

curriculum for children **without** disabilities, then the arts, with appropriate adaptations, should be a part of the curriculum for children **with** moderate to severe disabilities that interfere with their interactions with the people, objects and events in their environment. The impact of the expressive arts on the developing young child with disabilities[6] has not enjoyed widespread regard; however, the arts, which are an important part of the regular early childhood education curriculum, have been neglected in special education settings, in spite of the fact that they offer important benefits for young children with disabilities. **ArtSpace** emphasizes elements of the visual arts, including drawing, painting, and sculpture.

Providing opportunities for young children to engage in the arts contributes to healthy development and learning. Children exhibit cognitive changes due to participation in art activities, and art activities have also been shown to aid both written and spoken communication and to enhance social development. The arts are far more than something for children to do when there is nothing else to do, or something to keep children quiet while adults do other things, or something to use to teach children to follow directions (as in teacher-directed art activities intended to "teach" children to follow adult models or isolated skills).

Art for children **without** disabilities focuses on the processes and outcomes of child-directed activities, exploration of a variety of materials, and the expectancy that children progress through a regular sequence of images from scribbles to recognizable objects and people (Kellogg, 1970; Lowenfeld & Brittain, 1975). Regular early childhood educators view the art as a positive contribution, emphasizing child-initiation, exploration of materials, and providing time for the child to develop his or her own visual art symbols (Hyson, 1985). Although special education staff sometimes use art in preschool programs, it is a crafts approach targeting teacher-directed products. Too often staff underestimate the potential benefits or the importance of children's drawing and painting in cognitive development or of children's role playing, dancing and singing in social development. Children with disabilities are afforded little time to explore materials and

[6]The term "young children with disabilities," includes children in birth to 3 early intervention services, and children from 3 to 8 with moderate to severe disabilities that hamper their interaction with people, objects, and events in their environment as detailed in Parts H and B or IDEA.

participate in child-initiated expressive arts activities for many reasons, sometimes because there are "more important things to do." The teacher-directed patterned product is often supported with the comment, "That's what the parents want."

When art activities are included in the curriculum for children with disabilities, the arts are likely to be viewed as vehicles to meet a specific therapeutic objective (i.e., finger painting for children who are tactily defensive, or listening music to set or change a child's mood or behavior) and tend to be adult-directed (i.e., teaching children to draw diamonds with "proper" corners or to make "recognizable" trees using an adult image; engaging children only in structured group singing activities). While art activities can meet therapeutic objectives, they also have the potential to produce other positive educational objectives. Providing early childhood staff with viable alternatives to traditional teacher-directed intervention approaches for expressive art activities in early childhood programs is essential. Such alternatives allow children to initiate their own art activities, experiment and explore their world and their feelings.

Technology and the arts. While a child may not be able to hold a pencil, crayon, or marker, that child **can** participate in art activities. Technology applications, i.e., computers and graphics (drawing) software, which can be accessed with a single switch activated by the head, knee, foot, or hand, make it possible for children with severe disabilities to draw with color, to print a hard copy of their drawings using a color printer, and in some applications, to make music. By accessing the computer with touch tablets such as a PowerPad™ or TouchWindow® and graphics software programs, a young child **can** engage in arts activities, including **ArtSpace**, with the other children in the classroom. If a child does not have the fine motor skills to hold a stylus or use a finger, then drawings can be produced by dragging a fist, side of the hand or heel of the hand (or foot) over the touch-sensitive surfaces of the tablets. The use of technology provides opportunities for a young child with or without disabilities to explore, experiment, and create art in addition to gaining computer skills.

Using multimedia. ArtSpace was designed to be interactive, to use a variety of media, including real time video of actual people, not animated images, and to provide children with

opportunities to explore and discover. This approach was used for a number of reasons. With the advent of more easily accessible multimedia technology, project personnel suspected that launching a CD-ROM from a Macintosh platform could provide useful educational materials. Multimedia tends to support multiple intelligences that are not necessarily supported through a text-dominated environment, contends Fred D'Ignazio (1989). Multimedia supports both visual and auditory learners of any age and allows them to move through materials in a non-linear fashion, depending on what they want to learn.

Description of the Project

ArtSpace was developed because the arts really are important in programs for children — those who have disabilities and those who do not. The arts are more than frills, more than hobbies, more than therapy; however, their importance in children's development is often misunderstood or unrecognized. Art offers opportunities for expression, communication, problem solving, fine motor development, social development, and much more.

ArtSpace provides a unique technology tool so young children can explore the visual arts. Although **The Studio** portion of **ArtSpace** was designed so that children with disabilities who cannot hold a paint brush or crayon to draw can participate in simulated drawing and painting, it can be used by children who exhibit differing disabilities or by typical children. The **Galleries** can be navigated by mouse, scanning, or single switch. Older children and adults also find exploring the Galleries interesting, informative, and fun.

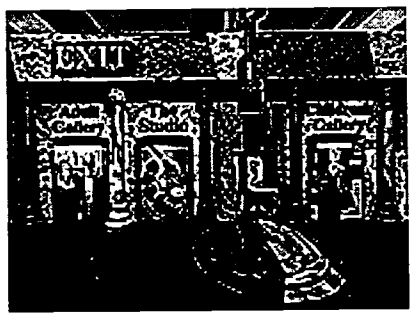
ArtSpace was based on the assumption that providing children with exciting, open-ended art opportunities rather than packaged art activities or coloring books challenges children to use their own resources, including imagination, and provides many opportunities to develop knowledge and abilities. **ArtSpace's** accompanying curriculum provides a fresh look at art and contains ideas for using ArtSpace as well as other art activities, including graphics software.

The **ArtSpace Museum** provides a museum experience for children who live in communities that do not have access to an art museum. It can also be used as an introductory or follow-up experience for children who are fortunate to visit museums regularly or sporadically. In the museum, children will visit galleries of work produced by both children and adults. In the museum's studio, children can also participate in simulated drawing and painting experiences and print copies of the images.

System Requirements. **ArtSpace** requires at minimum a Macintosh LC with System 7 or higher, a 14 inch or larger color monitor, 4000 K of free RAM memory, and a CD-ROM drive. QuickTime is included on the **ArtSpace** CD-ROM.

Navigating the Museum. Trips through the **Museum** begin outside with Trevor, the child guide, then proceed to the Lobby (see Figure 2) which presents three places to visit. Trevor explains the 'hot spots,' and reappears from time to time, depending on the Preferences selected. The first time the CD-ROM is used, it is set on QuickTrip which allows little interactivity. This option must be changed in the Lobby to engage in a more comprehensive, interactive trip.

Figure 2. The ArtSpace Lobby



The two galleries have the same navigable areas. In each room, the user is presented with three pieces of art that can be accessed, two on the left and one on the right (See Figure 3). When the user selects an image, the Gallery Closeup (See Figure 4) appears. Each Gallery Closeup

Figure 3. An ArtSpace Gallery Room

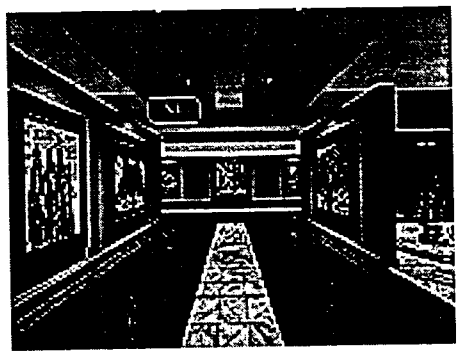
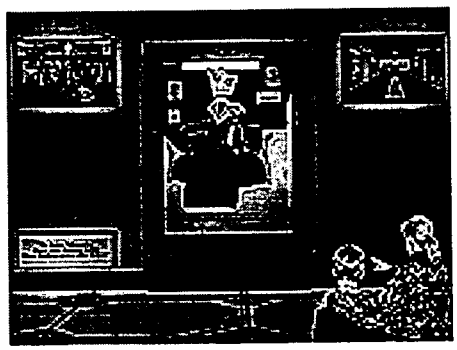


Figure 4. The Gallery Closeup



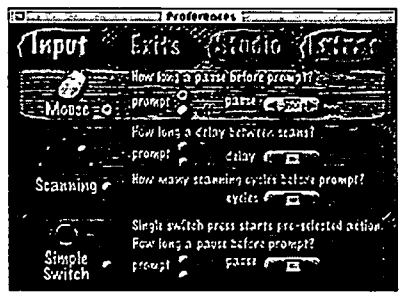
screen contains five hot spots, including observers, the framed image, and a plaque that tells about the art as well as a Lobby Return, and a Gallery Return.

When a child clicks the framed image, a close-up of the image appears with descriptive music which was composed especially for **ArtSpace** by Jay Zimmerman, a New York composer. After viewing the picture, if a QuickTime video is included of the artist(s) at work or commenting on aspects of the art, it then plays. Included are videos of an actual bronze casting, modeling sculpture, printing a lithograph, etching, painting, drawing, making pottery, collage, and block sculpture.

Included in ArtSpace is a set categories or content areas organized under "Categories Related to the Arts," "Categories Related to People and What They Do," and "Categories Related to Nature and Living Things." The 17 subcategories include Collage, Line, Music, Pottery, and Sculpture; People, Multicultures, Native Americans, Farms, Food and Eating, and Transportation; Animals, Birds, Flowers and Plants, Trees and Forests, Water, and Weather. When a particular category is selected, such as Animals, a tour can be taken through all the rooms where animal images appear in both the Adult Gallery and the Children's Gallery. The curriculum includes ideas for integrating the categories in children's learning experiences.

Preferences. The Preference menu can be accessed only in the museum lobby. Input preferences include a choice of Mouse, Scanning, and Simple Switch, whether or not to use prompts, the length of time before a prompt, and how long a delay to set between scans. Figure 5 shows the Input Preference Window. Preferences for exit options and the studio are also available. Studio options include the action to take after a child completes a drawing, who selects a new drawing, whether or not to use positive responses, prompts, and printing. Extras include auditory cues, a silencer, and a QuickTrip option.

Figure 5. The ArtSapce Input Preference Window



Discussion of Problems and Their Solutions

While we hold an Apple Developer's license and know that developing multimedia software is a time consuming, sometimes tedious, process that involves careful collecting, editing, organizing, and cataloging hundreds of images, sound bites, and videotape segments by a collaborative, coordinated team, the thundering reality hits hard. The amount of time taken to accomplish these tasks is dramatically increased when new staff are required. While the nature of the tasks in this ArtTech Project was thought to be understood by the original project team, several situations beyond our control led to new and inexperienced people stepping into the project midstream. In the beginning, everyone (with the exception of the designer/programmer and the graphics designer) was 'getting their feet wet' in the development process. However, staff turnover occurred when the husband of one of the original team took a job in Atlanta. Operating as a team was difficult when new people came on board and resulted in delays and detours down blind alleys, sometimes with work that had to be redone by another staff member. When personnel clearly do not possess the skills for which they are hired, in spite of information on resumes and follow-up phone calls to references, they must acquire those skills or be dismissed, a difficult decision at any time, but more critical when contracts are made on a yearly basis.

While futurists predict that with advancing technologies people will be able to work at home, in another city or state, and given the fact that the technology is now available to do just that, in practice such a situation is very difficult to maintain if the individual at home is expected to be a team player. One staff member did live in a distant location and communicated with project personnel via modem, phone, and automobile trips. The results tended to reduce team interaction and trust, and for this project, resulted in delays and misunderstandings that could easily have been cleared up with face to face interaction and closer supervision. However, the problems arising from working at a distance are not entirely human factors. Just as important, the technology must be working — if a network or host is shut down, no e-mail goes through, in spite of time constraints and deadlines. Problems in transferring files from one machine to

another are not easily resolved. Careful management alone cannot solve the problems caused by the factors discussed above.

Managing the sheer amount of data to be collected for an undertaking such as **ArtSpace** requires planning, cooperation, and a central computer and storage area. Maintaining quality control was another issue, particularly as it related to sound, videos, and content of comments about the artwork in the galleries. Changes should not be made unless the team agrees. In some cases, unapproved changes were made in our software screens, a situation resulting in last minute changes and team frustration. In other instances, approved changes were not made, resulting in more frustration and other problems.

Personnel issues contributed to some of the problems cited by the staff who saw **ArtSpace** through to a successful conclusion. However, other factors were also evidenced.

Project Impact

Products

Clearly one impact of the ArtTech Project is the CD-ROM, **ArtSpace**, and its accompanying curriculum, available at cost from Macomb Projects, Room 28, Horrabin Hall, Western Illinois University, Macomb, Illinois 61455. For further information contact Macomb Projects at 309-298-1634 or http:/www.ECNet.Net.users/mimacp/wiu/index.html.

Recommendations

The impact of the ArtTech Project includes thoughtful recommendations for further multimedia development from three staff members who saw the CD-ROM through to its final production. Recommendations are organized according to staff issues, product development and quality control issues, storage and security issues, and prototype testing issues. The recommendations, which follow, are intended to serve as a guide to other projects who decide to follow the multimedia path. If the problems are addressed in a timely fashion, they may alleviate

or prevent some of the difficulties we experienced. The recommendation list is currently being used in another software project[7], which is developing **Something's Fishy**, technology assessment software for young children.

Recommendations relating to staff.

•Share vision and purpose with **all** of the production and development staff members so that they clearly understand the direction of the project.

•Work as a team from the onset of the project.

•Hold brief staff meetings on a daily basis. Daily progress reports help to increase communication between workers and to circumvent problems as they arise.

•Hold full staff meetings at least monthly, at times, weekly, to review video graphics and sound, to provide feedback to staff regarding the quality and content of the material gathered, and to double-check the progress and the completion of multi-person tasks.

•Involve all production and development staff as much as possible from the very onset of the project. Everyone needs to be aware of the work other members are doing. If the direction of the project changes as the design portion evolves; be sure to communicate all changes to the entire team.

• Request that programmer expertise and guidance be shared early in the development of the product with all team members. The programmer's input should be sought during all phases of the development.

•Spend as much time as necessary helping any new staff understand the project's vision, as well as the technical and abstract aspects of the program. Time spent early saves time in the long run.

•Require staff members to read *Multimedia Demystified: A Guide to the World of Multimedia from Apple Computer, Inc.*, as this would aid their understanding of some of the more abstract multi-media information necessary for the production of a CD-ROM.

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[7]The Technology Assessment Software Package (PR#H133G40141) is funded by the National Institute on Disabilities and Rehabilitation Research.

After all members have read the book, the group should meet to discuss and clarify the information.

- Define and assign project tasks to specific persons who are held accountable for the timely completion of those tasks.
    - •Designate a production coordinator with excellent organizational skills to define and assign tasks; to supervise, direct, and redirect activities; to review task progress; and to conduct and maintain regular conference calls, e-mail, or both with free-lancers and off-site workers to ensure the timely completion of tasks.
    - •Provide off-site workers with access to communication resources, such as e-mail for daily check-ins, to avoid spending time on tasks that do not complement the work being done by the rest of the team and to clarify that the material they are working on is on target with the goals of the project.
    - Create a system for accountability and the timely completion of off-site workers' specific tasks.
    - •Create clearly defined task analyses for multi-person tasks.
    - •Create a form for multi-person tasks which can be checked off as each person's work is completed.

Recommendations relating to product development and quality control.

- •Set realistic timelines for developing and refining the product design between the field testing of the prototype and the final production, especially if the project has inexperienced personnel on the team.
    - •Allow ample lead time for the initial design phase; don't attempt to construct a story board until the design is complete.
- •Establish quality control guidelines early in the development of the product.
    - •Sound: establish a written protocol and criteria for the correct use of sound equipment, and provide hands-on training sessions for those responsible for collecting sound input. Use a MIDI or digital format to prevent sound distortions between computers.

•Video: write specific guidelines about collecting video footage and hold an inservice on the appropriate techniques to be used while shooting videos before any filming takes place. After the first filming attempts, the footage should be immediately reviewed to ensure that the video is consistent with quality control guidelines. If the footage does not meet quality control guidelines, review the proper troubleshooting procedures to find and correct the problem source. The 1994 edition of *Multimedia Demystified: A Guide to the World of Multimedia from Apple Computer, Inc.* contains a section which would be a good reference for camera angles, composing frames, and camera movements.

•Write guidelines for the specifications for the length of video footage and sound.

•Create a "check-off" form for graphics, video, and sound approval early in the project. Circulate the form to all team members as each graphic, video, and sound is collected so there is a paper-trail of approvals or disapprovals of graphics, video footage, and sound being considered for the product.

•Avoid costly and time consuming delays by reviewing products monthly and establishing a cut-off point, after which no additional content changes or revisions should occur. There should not be revisions or content changes late in the project.

•Make quality control checks weekly or daily, so that any graphic, sound, or video item can be redone, if necessary, in a timely manner.

Recommendations relating to storage and security.

•Keep a paper trail of all the original media and each revision.

•Make documentation accessible to the production team, but do not leave it in an unsecured area. Use a check out system.

•Keep materials on a central machine so that all team members can check the status of the current work.

•Maintain detailed records on all materials accumulated for the project in a central location.

•Ensure that **no un-approved changes** can be made to the files.

•Entrust one person with all accumulated records. That person should be the only one with direct access to the master copy of materials.

•Store a master copy of the materials on a separate machine which can be locked to prevent accidental tampering or, at intervals, produce multiple CD-ROM master copies of the material in-house.

Recommendations related to testing the prototype.

•Identify a large target audience with a broad range of disabilities in a cross-section of sites to evaluate all aspects of the prototype, especially those aspects concerning accessibility and ease of operation for children with a wide range of abilities.

•Provide adequate time for prototype testing, problem solving, and necessary modifications.

•Test prototypes at all stages of development to gain feedback and further refine the design prior to production.

•Do not plan prototype testing over the summer when programs for children are not in session.

Findings

Limited findings relate to events occurring during field testing. For example, field testing the art activities in the curriculum resulted in 100% participation by children — no one refused. Moreover, time on task was increased for the children who participated. One surprising finding during field test activities was the increased time and attention demonstrated by children with severe disabilities whose teachers had predicted little or no participation in planned art activities. The children, when given the software including elements of **ArtSpace**, graphics software, and adaptive peripherals, particularly the TouchWindow, exhibited unexpected positive behaviors. For example, one little girl reproduced her computer graphic scribble with yarn while she waited for the graphic image to print.

Children paid attention to Trevor, the child tour guide, and what he said. We believe that this is partially because we used real time video of a real child instead of the cartoon graphics and animation so often found on software for young children. One child, who cried most of the

day because of pain from recent surgery, was being fed when **ArtSpace** started in the classroom. He stopped and laughed every time he heard Trevor speak. When he was finished eating and took his turn at the computer, he continued to laugh when he saw and heard Trevor, and touched the screen where Trevor stood. In fact, **ArtSpace** activities were so successful that teachers expressed amazement as did administrators who came into classrooms to observe what to them was an unusual course of events.

Marketing

Marketing activities, conducted through Macomb Projects, focus on a direct mail campaign to a selected mailing list of Macintosh users also interested in early childhood, articles, software review columns, information on Macomb Projects' World Wide Web home page, distribution to key early childhood technology professionals and university personnel in 10 states, personal contacts, and national conference presentations. Other dissemination sources are currently being explored, including foundations and museums. Marketing efforts continued after the end of the project and resulted in promising avenues of dissemination. For example, to date, school districts as far apart as Florida and West Virginia have ordered **ArtSpace**, in addition to persons from Florida, Illinois, Iowa, Michigan, New York, Ohio, Pennsylvania, and Wisconsin, with one request surprisingly coming from Tokyo, Japan.

Publications and Conference Presentations. Information about **ArtSpace** has been published in *ACTTive Technology*, copies of which are sent to ERIC, and discussed in an article by the Project Director (Hutinger, in press). Conference presentations include Closing the Gap in Minneapolis, Minnesota, in October 1995; the Technology, Educational Media, and Materials Project Directors' meeting in Washington, DC in November 1995; the Florida Assistive Technology Conference in Orlando, Florida, February 1996; and the ACTT VI and VII Conferences in Macomb, Illinois, in March 1995 and 1996. Presentations to special education personnel at national conferences resulted in positive evaluations of the software and curriculum activities and invitations to present at other conferences. The following comments are

representative of those we received on evaluation forms. *"This is a great idea! The children in my room rarely draw on their own." "Your scan is very functional." "The input option choices make this software useful for children of all abilities." "The colors are eye catching and I am amazed by all the choices of artwork." "The children's gallery is so refreshing! My students will love it!"*

Future Activities

The materials, **ArtSpace** and the accompanying curriculum, created by the Expressive Arts Project for Young Children with Disabilities will continue to be disseminated. The CD-ROM will be revised as further feedback is received and as funding permits. Information about the products and the concepts used in their development and creation will continue to be disseminated through articles, advertisements, and conference presentations.

Assurance Statement

Copies of this Final Report have been sent to ERIC, and copies of the title page and Executive Summary have been sent to the following: NEC*TAS, Chapel Hill, NC; National Clearinghouse for Professions in Special Education, Reston, VA; National Information Center for Children and Youth with Disabilities, Washington, DC; Technical Assistance for Parent Programs Project, Boston, MA; National Diffusion Network, Washington, DC; Child and Adolescent Service System Program, Washington, DC; Northeast Regional Resource Center, Burlington, VT; MidSouth Regional Resource Center, Lexington, KY; South Atlantic Regional Resource Center, Plantation, FL; Great Lakes Area Regional Resource Center, Columbus, OH; Mountain Plains Regional Resource Center, Logan, UT; Western Regional Resource Center, Eugene, OR; and Federal Regional Resource Center, Lexington, KY.

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